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Nos. 82-524, 82-545, 82-551

IN THE

Supreme Court of the United States

OCTOBER TERM, 1982

BALTIMORE GAS AND ELECTRIC COMPANY, *et al.*,
Petitioners,
v.
NATURAL RESOURCES DEFENSE COUNCIL, INC.,
Respondent,

UNITED STATES NUCLEAR REGULATORY COMMISSION, *et al.*,
Petitioners,
v.
NATURAL RESOURCES DEFENSE COUNCIL, INC., *et al.*,
Respondents,

COMMONWEALTH EDISON COMPANY, *et al.*,
Petitioners,
v.
NATURAL RESOURCES DEFENSE COUNCIL, INC., *et al.*,
Respondents.

On Writs of Certiorari to the United States Court of Appeals for the District of Columbia Circuit

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BRIEF FOR RESPONDENT NATURAL RESOURCES DEFENSE COUNCIL, INC.

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QUESTIONS PRESENTED

I. Whether, under the National Environmental Policy Act (NEPA) and on the basis of the record below, the Nuclear Regulatory Commission (NRC) could adopt a generic rule identifying the environmental impacts of nuclear waste disposal, but excluding the admitted and significant risks that a long-term waste disposal system would not be developed or that it would not operate as expected.

II. Whether, when the generic rule failed to take account of or disclose such risks, the NRC could foreclose consideration and disclosure of such risks in the environmental impact analyses required in individual reactor licensing actions.

III. Whether, when the NRC has acknowledged that NEPA requires consideration of health, socioeconomic, and cumulative impacts in environmental impact statements, it could, in the original and unamended interim versions of its generic rule quantifying the impacts of the uranium fuel cycle, foreclose agency decisionmakers from considering these impacts in individual licensing actions.

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BRIEF FOR RESPONDENT NATURAL RESOURCES DEFENSE COUNCIL, INC.

STATEMENT

The National Environmental Policy Act[1] requires a federal agency to prepare an environmental impact statement before reaching a decision on a major federal action significantly affecting the environment. Without question, the licensing of a commercial nuclear power plant by the Nuclear Regulatory Commission[2] is such an action. Normally, the environmental impact statement for a nuclear power plant is prepared by the Commission staff for presentation to a three-member Atomic Safety and Licensing Board, which conducts hearings and decides whether to grant a construction or operating license.[3] The NRC has chosen, however, to address the environmental impacts associated with uranium fuel cycle activities on a generic basis.[4] The principal issue in this case is whether the Commission's generic rule, purporting to set forth the environmental effects of the uranium fuel cycle, is invalid because it fails to permit adequate disclosure or consideration in individual licensing actions of the significant risks of environmental impact associated with high-level nuclear waste.

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[1] 42 U.S.C. §§ 4332 *et seq.* (1976) [hereinafter cited as NEPA].

[2] The Energy Reorganization Act of 1974, 42 U.S.C. §§ 5801 *et seq.* (1976), transferred the licensing and regulatory authority of the Atomic Energy Commission (AEC) to the newly established Nuclear Regulatory Commission (NRC). "Commission" as used herein will refer to both the AEC and the NRC.

[3] *See generally Vermont Yankee Nuclear Power Corp. v. NRDC*, 435 U.S. 519, 526-27 (1978).

[4] The uranium fuel cycle includes the preparation of uranium fuel elements and the disposal and/or reprocessing of spent fuel and other radioactive wastes. Reprocessing is the process by which reusable portions of the spent fuel elements are extracted for recycling into new fuel elements and the remaining radioactive wastes are concentrated. There are currently no commercial reprocessing facilities in the United States.

1. *The Nuclear Waste Problem*

Commercial nuclear reactors generate radioactive waste which is both highly toxic and extremely long-lived.[5] By 1979, commercial nuclear energy production in the United States had produced over 2000 metric tons of discharged spent fuel and 80,000 cubic feet of other high-level wastes.[6] The scope and magnitude of the nuclear waste problem is well-recognized. As one report to Congress stated:

> [High level waste] is considered one of the most hazardous and complex of all radioactive wastes to manage. . . . The radioactivity produced by these materials can damage or destroy living cells, causing cancer and possibly death, depending on the quantity

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[5] In *Vermont Yankee*, 435 U.S. at 538-39, this Court recognized that each commercial nuclear power reactor produces "well over 100 pounds of radioactive wastes [per year], some of which will be highly toxic. The [Nuclear Regulatory] Commission itself clearly recognizes that these wastes 'pose the most severe potential health hazard . . . .'"

[6] Interagency Review Group on Nuclear Waste Management, Report to the President 11 (U.S. Dep't of Energy Pub. No. TID-29442, 1979) [hereinafter cited as IRG Report].

High-level waste includes spent nuclear fuel, liquid wastes from reprocessing, and solids into which such liquid wastes have been converted. *See* 10 C.F.R. § 60.2(j) (1982). Transuranic wastes are wastes that contain "alpha-emitting transuranic nuclides" which present "a special type of hazard because of their long half-lives and high radiotoxicity." U.S. Environmental Protection Agency, Draft Environmental Impact Statement for 40 C.F.R. 191: Environmental Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes 16 (December 1982). Except for certain volatile gaseous radionuclides which are assumed to be released during reprocessing or prior to the sealing of a permanent repository, the NRC rule at issue here assigns a zero environmental impact to high-level and transuranic wastes. *See* U.S. Nuclear Regulatory Comm'n, Uranium Fuel Cycle Impacts From Spent Fuel Reprocessing and Radioactive Waste Management, 44 Fed. Reg. 45,362, 45,368 (1979). For purposes of this brief, the term "high-level wastes" will be used to refer to non-volatile high-level and transuranic wastes, including spent fuel.

> and length of time individuals are exposed to it. Therefore, disposal techniques must be developed to assure that the radiation and toxicity from this waste will not affect either present or future generations.[7]

The most commonly discussed disposal technique involves permanent storage of the wastes in underground repositories.

Although scientists and policymakers have been aware of the waste problem since the inception of the domestic nuclear power program in the 1950's,[8] little has been done to resolve it, despite periodic assurances that a solution was just over the horizon.[9] In 1965, for example, the

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[7] Report to the Congress by the Comptroller General, Nuclear Energy's Dilemma: Disposing of Hazardous Radioactive Waste Safely 3 (EMD-77-41) (1977) [hereinafter cited as GAO Report]. *See also* IRG Report at Appendix F-1:

> The intense radioactivity and persistence over several hundreds to hundreds of thousands of years of radionuclides contained in high level waste make it imperative that these be isolated from the biosphere until they have decayed to safe levels of activity.

[8] As early as 1955, the AEC asked an advisory committee of the National Academy of Sciences to identify geologic formations that might be suitable for high-level waste disposal. GAO Report at 8.

[9] In 1976, President Ford announced that 1985 was the target date for the first nuclear waste repository. *See* President's Statement on Nuclear Policy, 12 Weekly Comp. Pres. Doc. 1624, 1630 (Oct. 28, 1976). In February 1978, Department of Energy officials moved the date back to 1988. U.S. Department of Energy, Report of Task Force for Review of Nuclear Waste Management (Draft) 12 (Feb. 1978). The target date then slipped to between 1988 and 1992. IRG Report at 130. In 1980, the new date was sometime in "the mid-1990's." *See* President's Message to Congress Establishing a Radioactive Waste Management Program, 16 Weekly Comp. Pres. Doc. 296, 298 (Feb. 12, 1980). In February 1982, the Department of Energy announced that the first repository could be operational sometime between 1998 and 2006. U.S. Department of Energy, Draft National Plan For Siting High-level Radioactive Waste Repositories and Environmental Assessment, Executive Summary at v (Feb. 1982). NRC Commissioner Gilinsky recently ob-

AEC began storing spent fuel elements in an abandoned salt mine near Lyons, Kansas; this eventually developed into a proposal that a federal waste repository be built at the Lyons site. Unforeseen and unresolved technical and geologic problems, involving possible water entry, dissolution of the salt, and potential migration of radionuclides, were detected in the course of NEPA review. These led to the cancellation of the Lyons project in 1972.[10] A subsequent AEC waste disposal project on the Savannah River in South Carolina also was abandoned because of environmental concerns.[11] The Department of Energy then attempted to develop a repository known as the Waste Isolation Pilot Plant (WIPP) in Carlsbad, New Mexico. This also ran into major site suitability problems when on two occasions, in 1975 and more recently in 1981, test drilling disclosed unexpected geologic conditions that could affect the integrity of the proposed repository.[12]

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served "there have been too many failures and delays in federal waste planning for me to be confident of any schedule." Remarks Before the 10th Annual Illinois Energy Conference, October 13, 1982, *reprinted in* NRC Office of Public Affairs, News Release No. S-16-82.

[10] GAO Report at 8; U.S. Department of Energy, Final Environmental Impact Statement for the Waste Isolation Pilot Plant 2-7 (October 1980) [hereinafter cited as Final Environmental Impact Statement on WIPP]; Council on Environmental Quality, Sixth Annual Environmental Quality Report 629 (1975) [hereinafter cited as Sixth Annual CEQ Report]; U.S. Atomic Energy Commission, Division of Waste Management and Transportation, Federal Repository, Program Report (Dec. 1971), *reprinted as* Appendix 31 to AEC Authorizing Legislation, Fiscal Year 1973: Hearings Before the Joint Comm. on Atomic Energy, 92d Cong. 2d Sess. (1973).

[11] Sixth Annual CEQ Report at 629.

[12] *See* Final Environmental Impact Statement on WIPP, at 2-10, 2-11; "Radwaste Dump WIPPs Up Controversy", 215 *Science* 1483 (Mar. 1982) (noting that "DOE believed that the New Mexico site . . . was as close to an ideal location as it would find . . . ."); 22 *Nucleonics Week* 9 (May 21, 1981); *Nuclear Waste News* 1 (Winter 1982).

The states themselves, with increasing frequency, have expressed serious reservations about the long delays and continued uncertainties in formulating a solution to the nuclear waste problem. A number of states, concerned about the economics of nuclear power, have enacted legislation that could prevent further licensing of nuclear power plants within their borders until the waste disposal problem is resolved.[13]

It was not until 1980 that President Carter proposed what was represented to be the nation's first comprehensive radioactive waste management program.[14] In this connection, he stated that "past governmental efforts to manage radioactive waste have not been technically adequate" and "have failed to involve successfully the states, local governments and the public in policy or program decisions." [15] The Nuclear Waste Policy Act of 1982,[16] enacted in December of last year, establishes for the first time procedures for the selection of an initial repository site. The Act, however, does not establish a deadline for actual construction of a repository, nor does it exclude the possibility of using above-ground monitored storage in lieu of a geologic repository.[17] Moreover, the Act empowers a state or Indian tribe to veto a proposed site

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[13] *See, e.g.*, California (Cal. Pub. Res. Code § 25524.2 (West 1954 & Supp. 1980)); Wisconsin (*Advance Plans For Construction of Facilities, Findings of Fact and Conclusions of Law* [1964-81 New Developments Transfer Binder] Nuclear Reg. Rep. (CCH) ¶ 20,093 at 16,562); Maine (Me. Rev. Stat., tit. 10 §§ 252-53 (1980)); Oregon (Act of July 1, 1979, ch. 510, 1979 Or. Law 629); Massachusetts (Mass. H. Res. 5021, adopted May 20, 1981, finalized May 28, 1981); and Connecticut (Conn. Gen. Stat. Ann. § 22A-136 (West Supp. 1981)).

[14] 16 Weekly Comp. Pres. Doc. at 296.

[15] *Id.*

[16] Pub. L. No. 97-425, 96 Stat. 2201 *et seq.* (1982).

[17] Section 141 establishes the Monitored Retrievable Storage system as an alternative method for long-term storage of nuclear waste in above-ground facilities.

within its territorial jurisdiction.[18] Finally, the Act does not purport to solve the environmental problems associated with nuclear waste; Congress expressly rejected an attempt to elevate passage of the Act to a definitive finding that the waste problem has been solved.[19]

In short, as of today, no one has designated a single site for a nuclear waste repository, nor has a program for construction and operation of such a repository been developed.[20] In the meantime, the spent fuel from currently-licensed commercial reactors is rapidly accumulating in temporary storage pools. 47 Fed. Reg. 58,196 (1982).

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[18] Pub. L. No. 97-425, § 115(b). Congress can override a veto by passing a resolution, within 90 days of the veto, approving the recommended site. Pub. L. No. 97-425, § 115(c).

[19] Senator McClure introduced an amendment during Senate consideration of the bill which would have required all courts to construe the Nuclear Waste Policy Act as satisfying any legal or statutory requirement for safe disposal of nuclear waste or spent fuel. This amendment attracted strong opposition. In particular, Senator Hart stated:

> When did Congress acquire the omniscient authority to declare that an undemonstrated technology, with all its uncertainties, will ultimately prove successful? Certainly, a legislative declaration will not guarantee the success of efforts to dispose of nuclear waste. . . . Indeed, the very purpose of this bill is to establish a program that we all hope, but cannot be sure, will lead to the permanent disposal of high-level nuclear waste.

128 Cong. Rec. S6404 (daily ed. May 27, 1982) (statement of Sen. Hart). Senator McClure's amendment was deleted from the final version of the Act. In fact, Congress required that the repository be designed to allow waste retrieval for safety or environmental reasons, apparently out of concern for unforeseen problems with the repository system. Pub. L. No. 97-425, § 122.

[20] *See, e.g.*, 44 Fed. Reg. 45,362, 45,374 (1979) (Separate views of Commissioner Gilinsky on Final Adoption of the Table S-3 Rule); *As The Nuclear Garbage Heap Grows, So Does the Dispute Over Storing It*, Nat'l J. at 1540 (Sept. 11, 1982).

2. *The Commission's Response: Table S-3*

The central focus of this case is the manner in which the Commission has chosen to set forth the environmental impact of nuclear waste disposal, and in particular the potential environmental impacts associated with high-level and transuranic wastes. These impacts, along with other effects of the nuclear fuel cycle, are dealt with in a chart, labeled Table S-3, which appears in the Commission's regulations for implementing NEPA. 10 C.F.R. § 51.20 (1982).[21] Table S-3 purports to disclose, in "full and candid" fashion,[22] the annual short- and long-term environmental impacts of uranium fuel cycle activities, attributable to a standard 1000 megawatt nuclear power plant. The table is incorporated into the individual environmental impact statement of each proposed nuclear power plant, and the values appearing in the table are factored into the cost-benefit analysis performed by the licensing board. These numerical values are not subject to challenge in the licensing process.

The table attempts to quantify, among other things, the number of acres of land to be devoted to repositories and the number of metric tons of chemical pollutants that are expected to be discharged by various fuel cycle activities. On the key issue of waste disposal, however, Table S-3 is cryptic. According to the highlighted portion of the table reprinted in the appendix, a standard commercial nuclear reactor will produce, on an annual basis, 1.1×10^7 (*i.e.*, eleven million) curies of high-level and transuranic waste. The table notes, however, that this waste will be "[b]uried at Federal Repository." Based on this prediction, the Commission has concluded that this massive amount of radioactivity will be successfully iso-

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[21] For the convenience of the Court, the final version of Table S-3 is reproduced as an appendix to this brief. The portion of the table dealing with the disposal of high-level and transuranic wastes has been highlighted.

[22] 41 Fed. Reg. 45,849 (1976).

lated from the human biosphere for tens of thousands of years. The Commission has instructed individual licensing boards to adhere to this conclusion and to assume that there will be a zero-release of radiation from the high-level wastes encompassed by this entry.[23]

3. *The History of Table S-3*

a. *The Original Rule (1974)*

Table S-3 is the product of a generic rulemaking begun by the Commission in 1972. 37 Fed. Reg. 24,191 (1972). The purpose of this rulemaking was to formulate amendments to the Commission's NEPA regulations "that would deal with the question of consideration of environmental effects associated with the uranium fuel cycle in the individual cost-benefit analyses for light water cooled nuclear power reactors." *Id.* at 24,192. The original version of Table S-3, promulgated in 1974, contained no numerical entries for the environmental effects of high-level and transuranic waste. *See* 39 Fed. Reg. 14,188, 14,191 (1974). In 1976, the court of appeals invalidated the table on the basis of inadequate rulemaking procedures under the Administrative Procedure Act, 5 U.S.C. § 551 *et seq.* (1976) (APA). *Natural Resources Defense Council, Inc. v. United States Nuclear Regulatory Commission*, 547 F.2d 633 (D.C. Cir. 1976) (*NRDC v. NRC I*). This Court subsequently reversed that decision, finding that the Commission had complied with the rulemaking requirements of the APA, and remanded the case to the court of appeals. *Vermont Yankee Nuclear Power Corp. v. NRDC*, 435 U.S. 519 (1978).

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[23] The Commission stated when promulgating the final Table S-3 rule, that "taking post-sealing releases as zero does not significantly reduce the overall conservatism of the table." 44 Fed. Reg. 45,362, 45,369. The Atomic Licensing and Appeals Board, in utilizing Table S-3, also noted that the Commission intended it to conclude that there would be no radiation release from the repository. *In re Vermont Yankee Nuclear Power Corp. (Vermont Yankee Nuclear Power Station)*, 6 N.R.C. 25, 30-32 (1977) (Farrar concurring).

b. *The Interim Rule (1977)*

In response to *NRDC v. NRC I*, the Commission began a new rulemaking proceeding to revise the Table S-3 rule. 41 Fed. Reg. 45,849 (1976). The proposed interim rule provided—partly in reliance upon a staff study of nuclear waste management[24]—that permanent disposal of high-level wastes could be achieved without any release of radiation to the environment.[25] The Commission conceded, however, that there were considerable "uncertainties" concerning the feasibility of safe, long-term waste storage:

> [T]here are still uncertainties in areas such as the effect of waste presence on repository stability; the probabilities and consequences of intrusive acts by humans; the validity of data used in modeling studies; the design and regulatory actions needed to minimize possibilities of repository failure; projection of future societal habits and demography, and, finally, the relative importance of various potential initiating events.

Id. at 45,850-51. In fact, the Commission acknowledged that many of the most important problems had not been resolved:

> In areas where information necessary for a complete quantitative assessment of environmental impacts is lacking (risks from sabotage, special risks from disposal of spent fuel or separated plutonium, and *risks from failure in the long term of the geologic repository for high level waste*) Federal programs are underway to resolve existing uncertainties.

Id. at 45,850 (emphasis added).

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[24] U.S. Nuclear Regulatory Comm'n, Environmental Survey of the Reprocessing and Waste Management Portions of the LWR Fuel Cycle (NUREG-0116, 1976) [hereinafter cited as NUREG-0116].

[25] NUREG-0116 at 2-31 n.f, 2-33.

Respondent challenged the assumption that a long-term repository could be designed and operated with no risk of harm to the environment, particularly in light of the extreme uncertainties acknowledged by the Commission. Respondent also argued that the bare numerical values in Table S-3, without narrative explanation, failed to disclose anything meaningful about the health, socioeconomic and cumulative effects of the fuel cycle activities listed in the table.[26] Nonetheless, in March 1977 the NRC promulgated its interim Table S-3 rule, reaffirming the implicit assumption that no environmental impact would result from high-level waste. 10 C.F.R. § 51.20 (1978). As with the original Table S-3 rule, the interim rule stated that the environmental effects of the nuclear fuel cycle "shall be as set forth in Table S-3," and that "[n]o further discussion of such environmental effects shall be required." 10 C.F.R. § 51.20(e) (1978).[27]

c. *The Final Rule (1979)*

In May 1977, the Commission reopened hearings to determine whether the interim rule should be made final. 42 Fed. Reg. 26,987 (1977). At this time, numerous participants opposed the rule, and respondent NRDC reiterated its objections. *See* Closing Statement of the Natural Resources Defense Council, Inc., *In re Amend-*

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[26] *See* Comments on NRC's Proposed Amendments to Table S-3, *reprinted in* U.S. Nuclear Regulatory Commission, Public Comments and Task Force Responses Regarding the Environmental Survey of The Reprocessing and Waste Management Portions of the LWR Fuel Cycle B-96, B-102 (NUREG-0216, 1977) [hereinafter cited as NUREG-0216]. These effects include such relevant matters as the number of cancer deaths associated with the radiation releases included in the table and the impact of waste storage facilities on local communities.

[27] The interim rule was subsequently amended to allow licensing boards to consider the health, socioeconomic and cumulative impacts of the values in Table S-3, on the ground that these effects were not otherwise "addressed at all by the Table." 10 C.F.R. § 51.20, Table S-3 n.1 (1979).

ment of 10 C.F.R. Part 51, Licensing of Production and Utilization Facilities, RM 50-3 (June 26, 1978), *reprinted in part*, J.A. at 210-37.

The record compiled in these hearings, together with the material already contained in the administrative record, indicated a large number of remaining uncertainties and a substantial degree of risk associated with nuclear waste disposal. These uncertainties included doubts whether adequate repository sites could be found and whether, if sites were found, the political will could be mustered to build actual repositories.[28] Related to this were concerns regarding potential radiation hazards during the period the waste remains above ground.[29] Indeed, the Commission's own Hearing Board, in examining the final version of S-3, expressed its concern that:

> [C]onsideration of the environmental impact of temporary storage of spent fuel has not, to this date, resulted in any positive action to build off-site interim storage facilities for the rapidly mounting volume of spent fuel. The record here indicates that within

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[28] *See, e.g.*, J.A. at 117-18 (Initial Statement of Terry R. Lash):

> [A]s recent events have shown, "[l]ocal political attitudes now loom as large as geologic criteria in the government's increasingly troubled attempt to find sites for the permanent disposal of radioactive waste." . . . The importance of . . . "institutional" barriers [arising from local political opposition] to successful waste management and disposal is recognized by virtually every study group except for the NRC's Task Force.

(Footnote omitted).

[29] *See, e.g.*, J.A. at 122-23 (Initial Statement of Todd R. La Porte):

> It is within [the period prior to final burial] that there is the greatest potential for accidental releases, and the concomitant damage will be done to the next four to six generations if there are difficulties with the disposal systems. This is the period when the technologies are most closely involved with human beings, workers [and] communities along the transportation routes, are most susceptible to human error, and pose the greatest threats of human exposure.

five years a lack of such storage space will have serious environmental and economic impacts on the country.

Conclusions and Recommendations of the Hearing Board Regarding the Environmental Effects of the Uranium Fuel Cycle, Pet. App. at 324a. There were also significant doubts raised—primarily by other federal agencies—about the performance of the untested waste disposal technology on which the Commission relied. These included questions about the modeling techniques used,[30] and serious reservations about the performance of a geologic repository over the long periods of time required for the waste to decay.[31] There was also widespread

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[30] *See, e.g.*, J.A. at 391 (IRG Report: "The risk assessments performed to date . . . have, with few exceptions, been based on idealized repository characteristics and are subject to significant uncertainties."); J.A. at 325 (USGS Circular 779); J.A. at 354 (Ad Hoc Panel Report: "[Nuclear waste transport models] could create unwarranted illusions of certainty."); J.A. at 360 (Ad Hoc Panel Report: "Current models do not incorporate parameter or process uncertainty in their forecasts. . . . The scenarios considered in the analyses are, in large part, arbitrary. . . ."); J.A. at 141 (USGS Response to NRDC First Round Question No. 2(a): "It is not possible to judge the uncertainties stated in section 4.4.2. of NUREG-0116 because no numbers are assigned to any of the uncertainties discussed. The text indicates many gaps in knowledge suggesting that in general present uncertainties of predictive modeling of waste behaviour [*sic*] are high.").

[31] *See, e.g.*, J.A. at 218-19 (testimony of Emilio E. Varanini, Commissioner, California Energy Resources Conservation & Development Commission); J.A. at 305 (USGS Circular 779: "[S]ome key geologic questions are unanswered, and answers are needed before the risk associated with geologic containment can be confidently evaluated. . . . Many of these interactions [between the host rock and waste] are not well understood, and this lack of understanding contributes considerable uncertainty to evaluations of the risk of geological disposal of high-level waste."); J.A. at 312 (USGS Circular: "[G]iven the current state of our knowledge, the uncertainties associated with hot wastes that interact chemically and mechanically with the rock and fluid system appear very high").

agreement that Table S-3 should be supplemented with a narrative that would make public the extreme uncertainties surrounding the values, and ensure that individual decisionmakers were aware of these uncertainties when reviewing nuclear power plant license applications.[32]

The Commission itself noted that the "back end" of the uranium fuel cycle posed particular problems in determining environmental impacts because of the unresolved uncertainties. 44 Fed. Reg. 45,362, 45,363 (1979). "Analysis of waste disposal necessarily involves greater uncertainty than interim storage because disposal technology has not yet been selected." *Id.* at 45,368. Regarding the "key issue" of locating a suitable site, the Commission stated:

> [*T*]*he evidence in the record* [*was*] *tentative but favorable.* . . . [G]eneral evidence, coupled with the absence of any strong argument that a site cannot be found, *probably affords as strong a record as can be made on the issue* until a specific site has been thoroughly investigated and found to be suitable.

Id. (emphasis added).[33]

In spite of the acknowledged uncertainties and risks in the record, as well as the urgings of various expert

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[32] *See, e.g.*, J.A. at 148, 208, 327, 359, 376, 392. Indeed, the Commission directed the staff to prepare such a narrative, 44 Fed. Reg. 45,362, 45,371 (1979), and a proposed narrative has been published. *See* 46 Fed. Reg. 15,154 (1981). To date, however, no narrative has been adopted.

[33] The Commission agreed with the IRG Report that uncertainties remained regarding both the likelihood of finding a site and the probability that it would perform as expected. "A suitable site is one at which a repository would meet predetermined criteria . . . . The feasibility of safely disposing of high-level waste in mined repositories *can only be* assessed on the basis of specific investigations at and determinations of suitability at particular sites." 44 Fed. Reg. 45,362, 45,368 n.24 (emphasis added).

agencies, the Commission explicitly rejected the idea of reflecting these uncertainties in Table S-3:

> In view of the uncertainties noted regarding waste disposal, the question then arises whether these uncertainties can and should be reflected explicitly in the fuel cycle rule. The Commission has concluded that the rule should not be so modified. . . . The Commission concludes, having noted that uncertainties exist, that for the limited purpose of the fuel cycle rule it is reasonable to base impacts on *the assumption which the Commission believes the probabilities favor, i.e.*, that bedded-salt repository sites can be found which will provide effective isolation of radioactive waste from the biosphere.

Id. at 45,369 (footnote omitted) (emphasis added). Thus, for purposes of quantifying the impact of high-level waste, the Commission assumed the following: (1) a repository site would be found (despite the absence of criteria, the lack of political consensus, and the historical experience at Lyons, Kansas, Carlsbad, New Mexico, and Savannah River, South Carolina), (2) the necessary technology would be developed in time, (3) the repository, once located and constructed, would not be subject to any type of geologic or human events that could cause a significant release of radioactivity, (4) no serious institutional or political obstacles would prevent the development of a specific repository when needed, and (5) no other problems would affect the waste prior to its disposal in the permanent repository.

Accordingly, the final Table S-3 rule continued to represent that the huge quantities of radioactive waste now building up in stockpiles, and to be created in the future, would be isolated from the biosphere for hundreds of centuries without any release of radiation—*i.e.* zero release. *Id.* at 45,368.

Two of the Commission's five members expressed reservations about the zero-release assumption embodied in the Table S-3 rule. Commissioner Gilinsky stated that he

"would not adopt at least one of the values in the table—the zero expected release from a high-level waste repository." *Id.* at 45,374. Noting that the "Commission's expressed confidence in the *perfect* long-term operation of such a waste repository may be misplaced," Commissioner Gilinsky observed:

> No such repository has yet operated. The prospective constructors of such a repository have not yet agreed on a design or even chosen the geologic medium. It seems anomalous, at this stage, for the regulators to express more confidence on this score than the repository designers and builders themselves have expressed.

Id. Commissioner Bradford also recognized that "there are uncertainties here, and the Board's summary of the record has not done them justice." *Id.* at 45,372 (footnote omitted).

4. *Proceedings in the Court of Appeals*

Respondent NRDC's petition for review of the final version of the Table S-3 rule was consolidated with the pending petitions regarding the original and interim rules.[34] In *Natural Resources Defense Council, Inc. v. United States Nuclear Regulatory Commission*, 685 F.2d 459 (D.C. Cir. 1982) (*NRDC v. NRC II*), the court of appeals held that all three versions of the Table S-3 rule were "arbitrary, capricious, . . . [and] not in accordance with law," 5 U.S.C. § 706 (1976), because they did not reflect the significant risks and uncertainties of the zero-release assumption, nor did they allow individual licensing boards to consider these significant risks in evaluating nuclear power plant licenses. *NRDC v. NRC II*, 685 F.2d at 484-85. The court also found that the original and

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[34] In accordance with this Court's suggestion in *Vermont Yankee*, 435 U.S. at 535-36 n.14, the parties stipulated that all three versions of the rule could be reviewed on the basis of the whole record. *Natural Resources Defense Council, Inc. v. United States Nuclear Regulatory Commission*, 685 F.2d 459, 471 n.39 (D.C. Cir. 1982).

unamended interim rules were invalid because they prevented licensing boards from considering the health, socioeconomic and cumulative effects of the fuel cycle. *Id.* at 490.

In reaching its decision, the court of appeals acknowledged that an agency could, if it properly determined that a particular environmental risk was insignificant, exclude it from consideration in individual environmental impact statements. *NRDC v. NRC II*, 685 F.2d at 479, 482. The court held, however, that a finding of insignificance must be based on the record. Accordingly, the court carefully reviewed the administrative record, noting the Commission's findings on risks and uncertainties in its statement accompanying the final Table S-3 rule. *Id.* at 480-81. Given the evidence and the NRC's own concessions, the court concluded that the NRC's zero-release assumption was arbitrary and capricious. *Id.* at 481.

Judge Wilkey dissented, observing that in his view the majority had done nothing more than substitute its judgment for that of the NRC on a technical issue. Judge Wilkey's disagreement with the majority, however, was founded upon a fundamental misinterpretation of the Table S-3 rule. Judge Wilkey based his dissent on the following observation:

> No fair reading of the Commission's stated intent at this time supports Judge Bazelon's conclusion that "the Commission's final Rule, like its two predecessors, does not *permit* licensing boards to consider either the risk that permanent waste management facilities will not be developed, or the risk that they will fail to perform as intended if they are developed."

NRC v. NRDC II, 685 F.2d at 530 n.84 (Wilkey, J., dissenting) (emphasis in original). Judge Wilkey reasoned that, since the values in Table S-3 were only a "starting point" for the decisionmaking process, then the Commission's choice of values to be included should be respected. Judge Wilkey's basic premise was mistaken, however.

The Commission plainly takes the view that the zero-release assumption in the Table S-3 rule does, in fact, preclude *any* further consideration of the risks that waste repositories will not be developed or will fail to perform as intended.[35] Judge Wilkey's opinion simply does not indicate whether he would have upheld the Table S-3 rule if he had recognized that it excludes these risks of high-level waste disposal from consideration altogether.

As a result of the court of appeals' decision, the orders adopting the rules were remanded to the NRC for further action. On November 1, 1982, the Commission issued a policy statement declaring that licensing of new plants would continue under the existing rules pending a final determination by this Court.[36] This Court granted writs of *certiorari* on November 29, 1982.[37]

SUMMARY OF ARGUMENT

Two main points are at issue in this case. The first is the meaning of NEPA's requirement that an agency contemplating a major federal action prepare a "detailed statement" on the "environmental impact of the proposed action." 42 U.S.C. § 4332(2)(C). Petitioners assert in defense of Table S-3 that, whatever the acknowledged risks and uncertainties of nuclear waste disposal may be, the potential environmental impacts of high-level radio-

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[35] *See* Brief filed in support of the Petition for Writ of Certiorari, United States Nuclear Regulatory Comm'n and the United States of America, No. 82-545 at 33-36; Brief on the Merits, United States Nuclear Regulatory Comm'n and the United States of America, No. 82-545, at 23-25.

[36] U.S. Nuclear Regulatory Comm'n, Licensing and Regulatory Policy and Procedures For Environmental Protection, Uranium Fuel Cycle Impacts [7590-01] (Nov. 1, 1982).

[37] Petitioners in these consolidated actions are Baltimore Gas and Electric Co., *et al.* (No. 82-524), the United States Nuclear Regulatory Comm'n, *et al.* (No. 82-545), and Commonwealth Edison Co., *et al.* (No. 82-551). Their respective briefs will be cited herein in the form "BG&E Brief", "NRC Brief", and "Com Ed Brief."

active wastes can be excluded from the environmental statement so long as the agency determines that the "probabilities favor" the occurrence of no harm. The court of appeals held, by contrast, that an agency can exclude a potential environmental impact from the NEPA decisionmaking process only if it properly finds that it poses no significant risk of harm to the environment. Risks are significant, the court said, when the probability and consequences of a given effect are such that the risk would be material to the decision being made.

NEPA itself does not define the term "environmental impact," nor does the legislative history supply a useful definition. In *Vermont Yankee*, this Court stated that "NEPA places upon an agency the obligation to consider *every significant aspect* of the environmental impact of a proposed action. . . ." 435 U.S. at 553 (emphasis added). The decisions of the lower federal courts support the position that agencies cannot exclude significant potential environmental impacts from the decisionmaking process solely because such effects are determined to be less than likely to occur. Similarly, the Council on Environmental Quality, whose interpretation of NEPA is entitled to substantial deference, requires environmental impact statements to include potential, but uncertain, environmental effects of an action.

Assuming that the proper reading of NEPA is that the Act requires significant risks to be included in the environmental impact statement, petitioners' second argument is that the Commission could have found on this record that no significant environmental risk exists from high-level nuclear waste. The court of appeals carefully and thoroughly reviewed the record and determined that, based on this record, such a finding would be arbitrary and capricious. Several expert agencies told the NRC that the Commission staff's confident predictions of no significant harm from waste disposal were unreliable because of substantial uncertainty about the prospects

for, and functioning of, the hypothetical waste disposal system. The Commission itself conceded that major uncertainties remained at the time the final rule was adopted, and repeatedly stated that substantial efforts would be required to minimize the risks. Confirmation of this uncertain outlook can be found in the Nuclear Waste Policy Act of 1982, in which Congress specifically concluded that "radioactive waste creates potential risks," that "Federal efforts during the past 30 years to devise a permanent solution to the problems of civilian radioactive waste disposal have not been adequate," and that "high-level radioactive waste and spent nuclear fuel have become major subjects of public concern." [38]

The court below thus did no more than what this Court mandated in *Vermont Yankee*, namely, to review the rule to determine whether, under the appropriate legal standard, it was arbitrary and capricious. The court's conclusions on both the legal and factual issues are amply supported.

ARGUMENT

I. THE DECISION BELOW IS FULLY CONSISTENT WITH THIS COURT'S REMAND ORDER IN VERMONT YANKEE

The court of appeals began its analysis of Table S-3 by observing that its review of the NRC's rules was limited to the standards expressed in the Administrative Procedure Act, namely, whether the rules were "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." *NRDC v. NRC II*, 685 F.2d at 475, *quoting* 5 U.S.C. § 706(2)(A) (1976). This was in full compliance with this Court's mandate to "review the rule as the Administrative Procedure Act provides." *Vermont Yankee*, 435 U.S. at 549. The court of appeals did not question the adequacy of the agency's rulemaking procedures, nor did it attempt to assess the desirability

[38] Pub. L. No. 97-425, § 111(a)(1), (3), (7).

of nuclear power. "Congress has left it up to the Commission to determine whether, in individual instances, the benefits of nuclear power outweigh the costs," the court explained. "All we consider is whether the Commission has complied with the mandates of the APA and NEPA in performing this task." *NRDC v. NRC II*, 685 F.2d at 475 n.75. The court of appeals thus undertook exactly the task laid down by this Court in *Vermont Yankee*:

> Upon remand, the majority of the panel of the Court of Appeals is entirely free to agree or disagree with Judge Tamm's conclusion that the rule pertaining to the back end of the fuel cycle under which petitioner Vermont Yankee's license was considered is arbitrary and capricious within the meaning of § 10(e) of the Administrative Procedure Act, 5 U.S.C. § 706 (1976 ed.). . . .

435 U.S. at 536 n.14.

The court below also did not challenge the Commission's decision to use generic rulemaking to develop a uniform environmental impact statement for nuclear fuel cycle effects. *See NRDC v. NRC II*, 685 F.2d at 484; *see also NRDC v. NRC I*, 547 F.2d at 641 n.17. The court of appeals plainly recognized, however, that Table S-3 is not valid merely because it is a generic rule. It must be judged by the same standards that apply to all environmental impact statements, whether generic or not. The question is whether the Table S-3 rule adequately complies with NEPA's requirement of a detailed statement that discloses the significant environmental risks and impacts of the proposed action and permits these factors to be considered in the decisionmaking process.

Critical to this issue is the NRC's "zero-release assumption." The Commission has posited that once the non-volatile high-level radioactive waste[39] is removed from a nuclear power plant, it will be completely isolated

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[39] *See supra* note 6.

from the environment. According to the Commission, these wastes—11 million curies of radiation per plant per year—can be stored at the plant site, transported to reprocessing facilities and repositories, placed in a repository, and sealed for hundreds of centuries, without any significant impact on the environment either now or in the future. Based on this assumption, the Commission has provided that its generic environmental impact statement should be read as containing a zero-entry for disposal of these non-volatile high-level wastes. *See, e.g.*, Table S-3, n.1; 44 Fed. Reg. 45,362, 45,374 (Separate Views of Commissioner Gilinsky on Final Adoption of the S-3 Rule) (1979). The Commission's licensing boards are forbidden to consider the risks that any of this radiation might be released.[40] Licensing of individual nuclear plants is to proceed as though, in effect, these wastes did not exist.

This Court itself, however, recognized the seriousness of the nuclear waste problem in *Vermont Yankee*:

> [T]hese wastes "pose the most severe potential health hazard. . . ." U.S. Atomic Energy Commission, Radioactive Wastes 12 (1965). Many of these substances must be isolated for anywhere from 600 to hundreds of thousands of years. It is hard to argue that these wastes do not constitute "adverse environmental effects which cannot be avoided should the proposal be implemented," or that by operating nuclear power plants we are not making "irreversible and irretrievable commitments of resources." 42 U.S.C. §§ 4332(2)(C)(ii), (v).

435 U.S. at 539. Based on a thorough review of the extensive record compiled in this proceeding, the court below held that the NRC's Table S-3 rule was arbitrary and capricious to the extent it represented a finding of no significant risk from such wastes, and that it was contrary to the National Environmental Policy Act to the

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[40] *See supra* note 23.

extent it attempted to exclude a significant risk from consideration and disclosure in the licensing process.

Despite petitioners' attempts to inject extraneous issues into this case, these are the only substantial questions raised here. This case is not about the propriety of generic rulemaking, nor is it about the wisdom of building nuclear power plants in the face of uncertainty regarding nuclear waste disposal. In the final analysis, it is a case about the Commission's prolonged attempt to isolate the problems of nuclear waste disposal from the process of deciding whether it is worth it, in any particular instance, to license a plant that will create substantial amounts of additional wastes. Nothing in *Vermont Yankee* suggests that the agency's discretion under NEPA encompasses the exclusion of significant environmental impacts from the decisionmaking process. The issue here is preserving the integrity of the NEPA process so that choices about the use of nuclear power are based on clear, candid disclosure and consideration of the significant environmental risks of creating high-level radioactive waste.

II. BECAUSE THERE IS A SIGNIFICANT RISK OF HARM TO THE ENVIRONMENT FROM HIGH-LEVEL NUCLEAR WASTE, THE COMMISSION COULD NOT EXCLUDE SUCH RISK FROM THE NEPA DECISIONMAKING PROCESS SIMPLY BY MAKING A 'POLICY JUDGMENT' THAT THE 'PROBABILITIES FAVOR' NO OCCURRENCE OF HARM

A. NEPA Requires Candid Disclosure and Meaningful Consideration of the Significant Environmental Risks of a Proposed Action

Section 102(2)(C) of NEPA, 42 U.S.C. § 4332(2)(C), provides that all federal agencies shall include in every recommendation on a proposal for major federal action a detailed statement on the environmental impact of the proposed action, including "the relationship between local short-term uses of man's environment and the mainte-

nance and enhancement of long-term productivity." Section 102(2)(C) is "one of the 'action-forcing' provisions intended as a directive to 'all agencies to assure consideration of the environmental impact of their actions in decisionmaking.'" *Kleppe v. Sierra Club*, 427 U.S. 390, 409 (1976), *quoting* Conference Report on NEPA, 115 Cong. Rec. 40,416 (1969) (statement of Sen. Jackson). "By requiring an impact statement Congress intended to assure . . . consideration [of environmental impacts] during the development of a proposal. . . ." *Id.* This impact statement is to "accompany the proposal through the existing agency review processes." 42 U.S.C. § 4332(2)(C). This requirement extends to every level of agency decisionmaking:

> [NEPA] marks an effort for the first time to impress and implant on the Federal agencies an awareness and concern for the *total* environmental impact of their actions and proposed programs. This awareness will be built into the agencies' planning processes at the lowest levels, where, as we all know, most decisions are formulated and even finalized.

115 Cong. Rec. 29,059 (1969) (statement of Sen. Church) (emphasis added).

NEPA itself does not define the "environmental impact" of the proposed action which the "detailed statement" must disclose.[41] Aside from indicating that NEPA

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[41] The Act does give general guidance on the types of impact Congress had in mind. Section 101(b), for example, sets forth the goals of the statute, which include "fulfill[ing] the responsibilities of each generation as trustee of the environment for succeeding generations" and "attain[ing] the widest range of beneficial uses of the environment without degradation, *risk to health or safety, or other undesirable and unintended consequences.*" 42 U.S.C. § 4331(b)(1), (3) (1976) (emphasis added). Obviously, an agency can only seek to avoid risks of harm to future generations if it acknowledges and deals with them in its decisionmaking processes. Congress further provided that the requirements of NEPA would apply to "decision making which *may* have an impact on man's

is concerned with the "*total* environmental impact" of federal actions, 115 Cong. Rec. 29,059 (1969), the legislative history is also unhelpful. This Court, however, has stated its unanimous view "that NEPA places upon an agency the obligation to consider *every significant aspect of the environmental impact* of a proposal action. . . ." *Vermont Yankee*, 435 U.S. at 553 (emphasis added).

The court below took the view that disclosure and consideration of a substantial environmental effect can be omitted only if the agency properly finds that there is "no significant risk that the environmental effect will occur." *NRDC v. NRC II*, 685 F.2d at 479. Requiring any less, the court said, would subvert NEPA since, when confronted with uncertainty, an agency could evade its NEPA obligations simply by finding that the effect is unlikely to occur. *Id.* at 479-80.

This ruling is fully consistent with established NEPA jurisprudence which requires compliance with the Act's mandate "to the fullest extent possible." 42 U.S.C. § 4332. Noting that the basic policy of NEPA is one of disclosure,[42] the lower federal courts have consistently held that agencies must identify and consider all significant potential environmental impacts, not just those that are most

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environment," and that agencies must "insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking." 42 U.S.C. § 4332(2)(A), (B) (emphasis added).

[42] *Columbia Basin Land Protection Ass'n v. Schlesinger*, 643 F.2d 585, 592 (9th Cir. 1981); *Sun Oil Co. v. United States*, 572 F.2d 786 (U.S. Ct. Cl. 1978); *Chelsea Neighborhood Ass'n v. United States Postal Serv.*, 516 F.2d 378, 389 (2d Cir. 1975); *Environmental Defense Fund, Inc. v. Corps of Eng'rs*, 492 F.2d 1123, 1140 (5th Cir. 1974); *Monroe County Conservation Council, Inc. v. Volpe*, 472 F.2d 693, 697 (2d Cir. 1972); *Environmental Defense Fund, Inc. v. Corps of Eng'rs*, 470 F.2d 289 (8th Cir. 1972), *cert. denied*, 412 U.S. 931 (1973); *Comm. for Nuclear Responsibility, Inc. v. Seaborg*, 463 F.2d 783, 787 (D.C. Cir. 1971).

probable or likely to occur.[43] This requirement is inherent in NEPA's express command that agencies study "the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity," 42 U.S.C. § 4332(2)(C), and the need to make reasoned decisions about "long-term environmental costs." *Sierra Club v. Morton*, 510 F.2d 813, 827 (5th Cir. 1975). Indeed, it is widely recognized that "one of the functions of a NEPA statement is to indicate the extent to which environmental effects are essentially unknown." *Scientists' Institute for Public Information, Inc. v. AEC*, 481 F.2d 1079, 1092, 1098 (D.C. Cir. 1973) (environmental impact statement should indicate uncertainties that exist); *Township of Lower Alloways Creek v. Public Service Electric & Gas Co.*, 687 F.2d 732, 741 (3d Cir. 1982) (environmental impact statement should disclose extent to which project might impose "uncertain or unknown risks" on environment).[44]

The regulations of the Council on Environmental Quality (CEQ), whose interpretation of NEPA "is entitled to substantial deference," *Andrus v. Sierra Club*, 442 U.S.

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[43] *See Township of Lower Alloways Creek v. Pub. Ser. Elec. & Gas Co.*, 687 F.2d 732, 741-42 (3d Cir. 1982); *Hanly v. Kleindienst*, 471 F.2d 823, 831 (2d Cir. 1972), *cert. denied*, 412 U.S. 908 (1973); *Sun Oil Co.*, 572 F.2d at 812 n.39; *Rucker v. Willis*, 484 F.2d 158, 162 (4th Cir. 1973); *Hiram Clarke Civic Club, Inc. v. Lynn*, 476 F.2d 421, 427 (5th Cir. 1973); *Monroe County Conservation Council, Inc.*, 472 F.2d at 698-99; *Maryland-Nat. Capital Park and Planning Comm'n v. United States Postal Serv.*, 487 F.2d 1029, 1041 (D.C. Cir. 1973); *Scientists' Institute for Public Information, Inc. v. AEC*, 481 F.2d 1079, 1089 n.43 (D.C. Cir. 1973); *McDowell v. Schlesinger*, 404 F. Supp. 221, 247 (W.D. Mo. 1975).

[44] *See also Sierra Club v. Sigler*, 695 F.2d 957 (5th Cir. 1983); *Louisiana v. Federal Power Comm'n*, 503 F.2d 844, 876 (5th Cir. 1974); *City of New York v. United States Dep't of Transp.*, 539 F. Supp. 1237, 1267 (S.D.N.Y. 1982); *National Indian Youth Council v. Andrus*, 501 F. Supp. 649, 671 (D.N.M. 1980); *Texas Comm. on Natural Resources v. Bergland*, 433 F. Supp. 1235, 1247 (E.D. Tex. 1977); *Citizens Against Toxic Sprays, Inc. v. Bergland*, 428 F. Supp. 908, 922 (D.Or. 1977).

347, 358 (1979), essentially codify these decisions, *Sierra Club v. Sigler*, 695 F.2d 957, 971 (5th Cir. 1983), and require an agency to reveal the extent of uncertainty about the environmental impacts of proposed actions:

> If . . . the information relevant to adverse impacts is important to the decision and the means to obtain it are not known (e.g., the means for obtaining it are beyond the state of the art) the agency shall weigh the need for the action against the risk and severity of possible adverse impacts were the action to proceed in the face of uncertainty. If the agency proceeds, it shall include a worst case analysis and an indication of the probability or improbability of its occurrence.

40 C.F.R. § 1502.22 (1982).[45] Thus CEQ requires the agency to include in the environmental impact statement information on "the risk and severity of possible adverse impacts" even if such impacts are not probable. *See Sierra Club v. Sigler*, 695 F.2d 957 (5th Cir. 1983) (upholding this CEQ regulation as consistent with "plain language" of NEPA).

The issue whether a risk is significant for purposes of NEPA review is ultimately a factual one. As the Third Circuit has observed, an agency should not be permitted to avoid its NEPA obligations "merely by *asserting* that an activity it wishes to pursue will have an insignificant effect upon the environment." *Township of Lower Alloways Creek*, 687 F.2d at 741 (emphasis added). Rather, courts must "review the administrative record to determine whether an 'agency has supplied convincing reasons

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[45] This is the CEQ's current interpretation of NEPA. Its earlier guidelines, in effect when this rulemaking was conducted, referred more generally to the need to "assess in detail the potential environmental impact" and "to provide decisionmakers as well as members of the public with an understanding of the potential environmental effects of proposed actions. . . ." 38 Fed. Reg. 20,550 (1973). The Commission's NEPA regulations, issued in 1974, state that preparation of environmental impact statements "shall be guided by the [CEQ's] . . . [g]uidelines. . . ." 39 Fed. Reg. 26,279, 26,283 (1974).

why potential impacts are truly insignificant.'" *Id.*, quoting *Maryland-National Capital Park and Planning Commission v. United States Postal Service*, 487 F.2d 1029, 1040 (D.C. Cir. 1973). *See also Save Our Ten Acres v. Kreger*, 472 F.2d 463, 466 (5th Cir. 1973). The question thus is whether the probability and consequences of a potential environmental effect are sufficiently severe, or are so uncertain, that a reasonable person deciding whether to authorize the activity would wish to be informed of the risk.[46] If so, the risk ought to be part of the NEPA decisionmaking process. If not, the agency can properly omit it. This "rule of reason" standard prevents agency abuse of the NEPA process while still permitting agencies to avoid giving undue attention to minor, trivial, or insubstantial possibilities.

B. NEPA Does Not Permit the Commission to Exclude The Significant Risks of Waste Disposal From Table S-3

Petitioners contend that, even if the risks of high-level waste disposal are significant, the Commission can exclude them from its generic environmental impact statement on "policy" grounds. This "policy" argument takes two forms. Petitioner BG&E argues that an agency can, and indeed must, make a judgment in each environmental impact statement about the "most likely" outcome in terms of the environment. BG&E Brief at 10, 26. This "most likely" predicted outcome—nowhere mentioned in the plain language of NEPA—then becomes the basis for the environmental impact statement. If, in the agency's view, the most likely outcome is that no harm will result from the proposed action, then the environmental impact statement is required to disclose this result only, without re-

[46] Of course, uncertainties about the probability and consequences of a particular threatened harm can contribute to the significance of the risk. *See* Latin, "The 'Significance' of Toxic Health Risks: An Essay on Legal Decisionmaking Under Uncertainty," 10 *Ecology L.Q.* 339 (1982).

gard to *any* risk that the agency's optimism may be ill-founded. *Id.* at 25-26.

As noted by the court below, this interpretation would effectively leave compliance with NEPA's procedural requirements at the whim of the agencies whose activities NEPA is meant to govern.[47] An agency bent on favoring a particular activity could almost always find a basis for predicting that the "probabilities favor" implementation of the proposal without substantial harm to the environment. However, "[a]n agency decision concerning NEPA requirements is not one committed to the agency's discretion by law. . . ." *Minnesota Public Interest Research Group v. Butz*, 498 F.2d 1314, 1320 (8th Cir. 1974) (en banc).

A simple example is the licensing of oil drilling in offshore waters. The responsible federal agency cannot ignore the possibility of a disastrous oil spill simply because it believes that the proper operation of an oil rig in normal conditions is unlikely to lead to a spill. *See Alaska v. Andrus*, 580 F.2d 465, 473 (D.C. Cir.), *vacated on other grounds sub nom., Western Oil & Gas Association v. Alaska*, 439 U.S. 922 (1978). Indeed, in *Weinberger v. Catholic Action of Hawaii*, 454 U.S. 139 (1981), the agency's generic conclusion that storage of nuclear weapons presents "no significant hazards to the environ-

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[47] It would also eviscerate the meaningful comparison of long term and short term impacts that section 102(2)(C)(iv) expressly requires, since long term impacts are, by their nature, likely to be uncertain. Such a comparison is especially important in dealing with an issue like nuclear waste disposal, where the potential effects extend far into the future and where the costs may be imposed on future generations who receive none of the present benefits of nuclear power.

The legislative history of NEPA indicates that Congress was deeply concerned with such long-term impacts: "The future of succeeding generations in this country is in our hands. It will be shaped by the choices we make. We will not, and they cannot, escape the consequences of our choices." 115 Cong. Rec. 40,417 (1969) (statement of Sen. Jackson).

ment," *id.* at 142, was not found sufficient to relieve the agency of the obligation to prepare an internal environmental impact statement on a "proposal to store nuclear weapons" at a particular site. *Id.* at 146 (emphasis deleted). Plainly, if agencies are told that under NEPA they need only consider and disclose the most "likely" impacts of a proposed action, then environmental impact statements will lack the essential candor that promotes public accountability.

The government puts forward a slightly narrower version of the "policy judgment" argument. The government contends that the procedural requirements of NEPA are fulfilled if an environmental impact statement (1) is made in advance of the proposal to which it relates, NRC Brief at 27; (2) is made by a "responsible official", *id.* at 27-28; and (3) contains a "detailed statement" of certain environmental impacts, *id.* at 28. The government argues that NEPA does *not* require consideration of all the significant potential environmental impacts when the ultimate decision on the proposal is made. Rather, the Commission is entitled to remove certain environmental factors from the decisionmaking process if it "weigh[s] for itself the uncertainties," *id.*, and determines that the "'probabilities favor'" the occurrence of no harm. *Id.* at 34.

As this Court has observed, however, the procedural regimen of section 102 serves two purposes: "The first is to inject environmental considerations in the federal agency's decisionmaking process by requiring the agency to prepare an [environmental impact statement]. The second aim is to inform the public that the agency has considered environmental concerns in its decisionmaking process." *Weinberger*, 454 U.S. at 143.

The requirement of disclosure of significant risks plays a critical role in the NEPA process by ensuring that the agency is politically accountable for its environmental decisionmaking. It is widely recognized that the "detailed

statement" requirement "helps ensure the integrity of the process of decision by precluding stubborn problems or serious criticism from being swept under the rug." *Silva v. Lynn*, 482 F.2d 1282, 1285 (1st Cir. 1973); *Sierra Club v. Morton*, 510 F.2d at 820. *See also Union of Concerned Scientists v. AEC*, 449 F.2d 1069, 1083 n.34 (D.C. Cir. 1974). It is precisely this function of NEPA with respect to nuclear waste disposal that is at issue in this case.

Despite the absence of any mention of the waste disposal problem in Table S-3, the government contends that the table adequately discloses the potential environmental impacts of waste disposal because it incorporates by reference certain background documents which discuss these risks. Petitioners note that the guidelines of the Council on Environmental Quality specifically permit "incorporation by reference," [48] and point to footnote 1 of Table S-3 which states:

> Data supporting this table are given in the "Environmental Survey of the Uranium Fuel Cycle," WASH-1248, April 1974; the "Environmental Survey of the Reprocessing and Waste Management Portion of the LWR Fuel Cycle," NUREG-0116 (Supp. 1 to WASH-1248), the "Public Comments and Task Force Responses Regarding the Environmental Survey of the Reprocessing and Waste Management Portions of the LWR Fuel Cycle," NUREG-0216 (Supp. 2 to WASH-1248); and in the record of the final rulemaking pertaining to Uranium Fuel Cycle Impacts from Spent Fuel Reprocessing and Radioactive Waste Management, Docket RM-50-3.

NRC Brief at 28-29.

Petitioners fail to mention, however, that the original CEQ guidelines, in effect throughout this rulemaking proceeding, required that "care should be taken to ensure that the statement remains an essentially self-contained

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[48] *See, e.g.*, 40 C.F.R. § 1502.21 (1982).

instrument, capable of being understood by the reader without the need for undue cross reference." 40 C.F.R. § 1500.8(b) (1973). The present regulations state that incorporation by reference is permissible if it will not "imped[e] agency and public review of the action." 40 C.F.R. § 1502.21 (1982). "The incorporated material shall be cited in the statement and its *content briefly described.*" *Id.* (emphasis added). It cannot seriously be argued that Table S-3 makes *any* meaningful disclosure about the risks and uncertainties of waste disposal or that it is "essentially [a] self-contained instrument" for these purposes. NEPA's requirement of a "detailed statement" surely is not satisfied if discussion of environmental difficulties occurs *only* in background documents, particularly where the generic environmental impact statement gives no specific guidance on where such discussion may be found.

NEPA's second key requirement—that environmental considerations be injected into the decisionmaking process—is likewise violated by Table S-3. Petitioners argue that acknowledged environmental problems can be excluded from the actual decisionmaking process simply because the agency has "considered" these problems in adopting a generic rule that otherwise omits any mention of them. This contention is flatly contrary to the settled construction of NEPA. While an agency is not required to give "determinative weight" to environmental factors, *Strycker's Bay Neighborhood Council, Inc. v. Karlen*, 444 U.S. 223 (1980), it must nonetheless identify and give serious consideration to environmental risks when reaching a decision on a proposed action.[49] And as the legislative history of NEPA shows, that decisionmaking process

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[49] *See, e.g., Strycker's Bay*, 444 U.S. at 231 (Marshall, J., dissenting); *Sierra Club v. Morton*, 510 F.2d 813, 819 (5th Cir. 1975); *Monroe County Conservation Council, Inc. v. Volpe*, 472 F.2d 693, 697 (2d Cir. 1972); *Committee for Nuclear Responsibility, Inc. v. Seaborg*, 463 F.2d 783, 787 (D.C. Cir. 1971); *National Helium Corp. v. Morton*, 455 F.2d 650, 656 (10th Cir. 1971).

includes "the agencies' planning processes at the lowest levels, where, as we all know, most decisions are formulated and even finalized." 115 Cong. Rec. 29,059 (1969) (statement of Sen. Church). Mere abstract consideration is plainly not enough. *Monroe County Conservation Council, Inc. v. Volpe*, 472 F.2d 693, 698 (2d Cir. 1972). The environmental impact statement must be permitted to have an impact on the decision being made. As the court of appeals held, if the risk is significant the Commission must "allow licensing decisions to be affected—either directly or indirectly—by the risk that nuclear waste will not be successfully isolated." *NRDC v. NRC II*, 685 F.2d at 483.

The government argues that it would be pointless to allow licensing boards to reject proposed licenses on a basis which included consideration of waste disposal risks, since the Commission, which can review decisions of licensing boards, "would surely overturn any [decision] that rested" on such a basis. NRC Brief at 33. This argument is deeply flawed.

Commission review of the decisions of licensing and appeal boards is purely discretionary. 10 C.F.R. § 2.786 (1982). At the time of the final rulemaking the Commission was reviewing fewer than 25 percent of the cases which came before the appeals boards. Staff Report to the President's Commission on the Accident at Three Mile Island at 26 & n.131 (1979). There is thus no reason to believe that all future Commissions would routinely overturn licensing decisions simply because waste disposal risks were given weight as an environmental cost factor.[50]

More important, licensing board consideration of waste disposal risks and uncertainties, far from being a useless exercise, is a vitally important part of the NEPA process. In relatively close cases, these considerations may well

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[50] Indeed, two of the Commissioners (Gilinsky and Bradford) have strongly questioned the zero-release assumption in Table S-3. 44 Fed. Reg. 45,362, 45,372, 45,374 (1979).

tip the balance between granting or denying a license. *See In re Vermont Yankee Nuclear Power Corp. (Vermont Yankee Nuclear Power Station)*, 5 N.R.C. 759, 765 & n.7 (1977).[51] The number of proposed nuclear plants that have been canceled since Table S-3 was adopted (at least 23)[52] demonstrates that the cost-benefit equation on many plants is actually quite marginal. Moreover, the comparison is often one between a nuclear power plant and a coal-fired or other fossil fuel plant that does not create radioactive waste. *See, e.g., In re Tennessee Valley Authority (Hartsville Nuclear Plant Units 1A, 2A, 1B & 2B)*, 5 N.R.C. 92 (1977).

For the Commission to say that it would "surely overturn" all licensing board decisions denying plant licenses in such marginal cases is arbitrary on its face. If full disclosure and fair consideration of the problems of nuclear waste disposal lead to the rejection of some marginal nuclear plant licenses, this result should not be subjected to automatic reversal. No one is asking the Commission to turn down all (or even any) license applications.[53] All respondents seek is what NEPA requires—

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[51] As the Appeals Board has stated:

> [A]lthough the adverse environmental consequences of the fuel cycle attributable to individual nuclear generating plants are small, they are not without any weight . . . . [I]n a close situation they might throw the cost/benefit balance against issuing a construction permit.

In re Potomac Electric Power Co. (Douglas Point Nuclear Generating Station, Units 1 and 2), 8 A.E.C. 79, 87 (1974).

[52] Atomic Industrial Forum, Inc., Public Affairs and Information Program: Historical Profile of U.S. Nuclear Power Development (1981) (supplemented by information supplied by AIF). This total includes only those plants canceled after issuance of a construction permit.

[53] The government completely mischaracterizes the issue at page 34 of its brief where it states that "[i]f . . . the problem of disposal is insoluble . . . the NRC should refuse to license *any* nuclear power plant." The question is not whether the problem is totally beyond

the opportunity for adverse environmental effects to make a difference in a proper case.

The government's final argument is that permitting licensing boards to consider the uncertainties of nuclear waste disposal will undermine the advantages of generic rulemaking.[54] Uncertainties and risks, the government argues, do not translate into the kind of numerical values appropriate for a chart. NRC Brief at 35. The Commission, however, cannot bootstrap its choice of a numerical format into a justification for omitting the uncertainties of waste disposal from the decisionmaking process. The agency has a duty under the plain language of NEPA to "insure that presently unquantified environmental amenities and values . . . be given appropriate consideration in decisionmaking along with economic and technical considerations." 42 U.S.C. § 4332(2)(B). If the Commission feels this cannot be done in a chart, it should not be heard to complain when it is required to proceed in some other fashion.[55]

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solution, but whether, despite good faith efforts to solve the problem, a significant risk to the environment exists. Such a risk may be acceptable if the benefits of a particular plant substantially outweigh all the other adverse effects, but may be unacceptable where the costs and benefits are otherwise equal, or where another equally acceptable alternative exists that does not pose such a risk.

[54] As a general proposition, this argument is extremely overstated. This generic rulemaking proceeding has already served at least two valuable functions by identifying the range of possible impacts of high-level nuclear waste and accumulating evidence regarding these impacts in an efficient manner. Exclusion of the significant risks of waste disposal is in no way necessary to the success of generic rulemaking in this area.

[55] Similarly, it is surprising that the government attacks the court of appeals for discussing cost-benefit analysis in this context. *See* NRC Brief at 34-35. The Commission itself has repeatedly stated that the purpose of the Table S-3 rulemaking was to provide licensing boards with environmental cost factors for use in the cost-benefit analysis conducted on each proposed plant. *See* 37 Fed. Reg. 24,191, 24,192 (1972); 41 Fed. Reg. 45,849 (1976); 42 Fed. Reg. 13,803 (1977); 42 Fed. Reg. 26,987 (1977). The question

As the government itself suggests, the defects of Table S-3 could be cured by laying out the facts of the disposal question, and summarizing the risks and uncertainties, in a narrative that could be considered by the licensing boards along with Table S-3. NRC Brief at 35-36. The mystery of this whole proceeding is the Commission's reluctance to take this step. The Commission now advances two explanations for this reluctance. First, it says, if licensing boards are allowed to consider the uncertainties set forth in a generic statement, "inevitably different boards . . . would assign different weights to even a small risk of great harm." *Id.* at 36. This observation, however, is little more than a makeweight. Different boards will also weigh differently the need for additional electric power and the hazards of locating a nuclear plant in a particular area. Yet the Commission has chosen to leave these questions, and their effect on the ultimate cost-benefit analysis of a plant, to individual boards. Indeed, in another context, the Commission has authorized individual licensing boards to discuss and consider the risks and uncertainties of serious reactor accidents despite its view that these accidents are highly unlikely.[56] Only in the area of waste disposal has the

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whether NEPA requires a cost-benefit analysis, as such, is not at issue in this case. All the court of appeals held is that, whatever decisionmaking process an agency chooses to use, it must factor into that process the significant environmental risks of the proposed action.

[56] *See* U.S. Nuclear Regulatory Comm'n, Nuclear Power Plant Accident Considerations Under the National Environmental Policy Act of 1969, 45 Fed. Reg. 40,101, 40,103 (1980) ("Events or accident sequences that lead to releases shall include but not be limited to those that can reasonably be expected to occur . . . . [T]he Commission is aware that there are and will likely remain for some time to come many uncertainties in the application of risk assessment methods, and it expects that its Environmental Impact Statements will identify major uncertainties in its probabilistic estimates.").

Commission sought to achieve "consistency" by eliminating the decisionmaker's discretion entirely.

The Commission's second justification is administrative convenience. Although it recognizes that, under the decision of the court below, boards would be prohibited from taking further evidence on waste disposal hazards, the Commission argues that the process of "assign[ing] weight" to these risks would "prolong the licensing proceeding." NRC Brief at 36. Merely allowing the boards to read and consider a generic statement discussing the risks and uncertainties of waste disposal, however, would not measurably delay the licensing process. Even if the length of proceedings were to be affected, mere administrative inconvenience is no excuse for failure to comply with NEPA's requirements. *See* H.R. Rep. No. 765, 91st Cong., 1st Sess. 9-10 (1969), *reprinted in* 1969 U.S. Code Cong. & Ad. News 2751, 2770; *Environmental Defense Fund, Inc. v. Tennessee Valley Authority*, 468 F.2d 1164, 1176 (6th Cir. 1972); *cf. EEOC v. Associated Dry Goods Corp.*, 449 U.S. 590, 604 (1981) (administrative convenience cannot override requirements of a statute). In short, the Commission's approach is neither consistent with NEPA nor justified by the supposed advantages of a purely numerical table.

C. The Record In This Case Demonstrates That the Commission Had No Basis for Finding the Risks Of Nuclear Waste Disposal To Be So Negligible That They Could Be Excluded From the NEPA Process

The Commission never explicitly found the risks of nuclear waste disposal to be insignificant. *See NRDC v. NRC II*, 685 F.2d at 483.[57] It simply determined that

[57] All the Commission has stated is that the environmental effects presently disclosed in Table S-3, which do *not* include these substantial risks, are "relatively insignificant." 39 Fed. Reg. 14,188, 14,190 (1974). At the time of this statement, Table S-3 did not even include an entry for high-level and transuranic wastes.

the "probabilities favor" zero release of radiation from non-volatile high-level wastes. It now argues, however, that its statements in adopting the Table S-3 rule can be read as implicitly constituting a judgment that the risks are minimal. To determine that "no significant risk" exists from high-level nuclear wastes, however, the Commission had to find that such wastes will not pose a significant radiation hazard from the moment they leave the nuclear power plant until the point, far in the future, when they have ceased to be radioactive. To make such a finding, the agency had to make assumptions not only about unlikely risks such as volcanic activity or meteor strikes at repository sites, but also about far more significant areas of risk about which too little is known to make accurate predictions.

These latter risks fall into three general categories. First, there is the risk that a long-term waste repository will not be built,[58] as evidenced by uncertainty about locating a suitable site, overcoming institutional obstacles,

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[58] Petitioner Commonwealth Edison argues at length that the court below improperly relied on *Minnesota v. NRC*, 602 F.2d 412 (D.C. Cir. 1979), a case discussing this uncertainty, citing as evidence of "reliance" a "*cf.*" reference in footnote 123 of the court of appeals' opinion. *See* Com Ed Brief at 34-46. Com Ed's argument appears to be merely a belated attempt to seek review by this Court of a decision from which no petition for *certiorari* was filed and which has been final for more than three years. The validity of the *Minnesota* case is simply not an issue here.

Com Ed also appears to argue that the court below erred in finding Table S-3 inadequate because of its failure to address the uncertainty whether repositories will actually be built. This issue, Com Ed argues, is before the Commission in the so-called "waste confidence" proceeding, *see* 44 Fed. Reg. 61,372 (1979), which was initiated by the NRC in response to the *Minnesota* decision. The "waste confidence" proceeding, however, does not eliminate the need to address risks in Table S-3. If a significant risk exists that repositories will not be built, the environmental impact statements of proposed nuclear plants, and hence Table S-3, must reflect that fact. This risk cannot be excluded from Table S-3 merely because the Commission is currently considering it in another forum.

and developing a political consensus.[59] If repository sites cannot be found in sufficient numbers, or if proper repositories cannot be built for political reasons, these high-level wastes will remain on or near the surface of the United States, where they will be susceptible to intentional or accidental release far into the future. Already there have been leaks from high-level liquid waste tanks in some locations,[60] and the potential for further releases multiplies the longer these wastes remain above ground.

A second and related category of risk involves the issue of what happens to the waste while it is awaiting disposal in a permanent repository. The risks at this stage include transportation accidents, sabotage, theft, and other events leading to a breach of the containers in which the waste is to be stored. As Judge Edwards noted in his concurring opinion, these risks are potentially very grave ones which do not appear to be reflected in Table S-3 at all. *NRDC v. NRC II*, 685 F.2d at 513-16.[61]

A final category of risk involves the question whether, once the wastes are buried in a repository, the repository will perform adequately. No such repositories have ever been built. Early experiments, such as the one at Lyons, Kansas, have not been promising. Most important, the

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[59] *See supra* note 28 and accompanying text.

[60] U.S. Atomic Energy Comm'n, Draft Environmental Statement On Waste Management Operations Hanford Reservation (WASH-1538) III.2-2 (Sept. 1974); Commission on Natural Resources, Radioactive Waste Management at the Savannah River Plant: A Technical Review 12 (1981).

[61] *See also* note 29 and accompanying text. Some of the environmental effects of transporting spent fuel may be covered under the Commission's Table S-4. However, it appears that Table S-4, like Table S-3, does not include any values for the risks of accidents or sabotage while these materials are being transported. 10 C.F.R. § 51.20(g) (1979). *See also* 41 Fed. Reg. 45,849, 45,850 (1976) (risks of sabotage not yet resolved).

degree of uncertainty about the future performance of a geological repository is, in the estimation of the principal government geological agency, "very high." J.A. at 312.

The Commission itself conceded that the evidence supporting the view that these risks were negligible was, at best, "tentative." 44 Fed. Reg. 45,362, 45,368 (1979). Moreover, it recognized that "areas of uncertainty remain regarding both the likelihood of finding a site and the probability that it will perform as expected." *Id.* (footnote omitted). But these comments from the Commission's Statement of Considerations accompanying the final rulemaking only hint at the extent of the uncertainty reflected in the rulemaking record.

Two of the key federal agencies which participated in the rulemaking—the Environmental Protection Agency (EPA) and the United States Geological Survey (USGS)—expressed substantial reservations about the finding of no significant risk of radioactive releases.[62] The EPA, for example, suggested that the Table S-3 chart should be accompanied by a narrative statement emphasizing the uncertainties underlying the numerical entries, particularly for long-term waste storage.

> A purely numerical table is, in fact, an implication of far greater certainty than is warranted by the facts. Clearly, for the time spans involved in presenting the impacts of certain radioactive effluents, there are environmental impacts difficult to quantify that require accompanying narrative.

J.A. at 208. A report by a panel of earth scientists, submitted to EPA and made part of the record herein, concluded that there are "extreme numerical uncertainties" attached to most of the factors bearing on the possibility

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[62] NEPA, of course, requires the Commission to "consult with and obtain the comments of any Federal agency which has . . . special expertise with respect to any environmental impact involved." 42 U.S.C. § 4332(2)(C).

of disruption of a waste repository. Report of Ad Hoc Panel of Earth Scientists, The State of Geological Knowledge Regarding Potential Transport of High-Level Radioactive Waste From Deep Continental Repositories, EPA/520/4-78-044, at 32 (June 1978), J.A. at 362.

Perhaps more significantly, the USGS—the federal agency with the greatest technical expertise in geological matters—concluded that "Table S-3 by itself clearly does not convey an appreciation of the risks involved in geological disposal of high-level radioactive wastes or the uncertainties involved in determining such risks." J.A. at 148. Moreover, a later USGS report warned that "given the current state of our knowledge, the uncertainties associated with hot wastes that interact chemically and mechanically with the rock and fluid system appear very high," and these uncertainties are compounded by "the lack of a method for determining the future rates of many [geological] events and processes." Geologic Disposal of High-Level Radioactive Wastes—Earth-Science Perspectives, USGS Circular 779 at 6, 11 (1978), J.A. at 312, 322.

Indeed, both of the reports relied upon by the Commission in promulgating the Table S-3 rule cautioned that predictions about the performance or feasibility of a waste-disposal facility are subject to considerable uncertainty. The IRG Report, for example, pointed out that the risk assessments were "based on idealized repository characteristics . . . and are subject to significant uncertainties," and concluded that the "zero release of radionuclides cannot be assured." J.A. at 391.[63] Moreover, the Commission staff acknowledged:

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[63] The IRG Report contained extensive findings and expert judgments concerning the vast spectrum of uncertainties and risks. The Report began by noting that a viable nuclear waste disposal program "will clearly require an unprecedented extension of capabilities in rock mechanics, geochemistry, hydrogeology. . . ." *Id.* at 3. It pointed out that "risk assessment computations are needed which are site specific in the origin of their data and in their application

> [T]here are still uncertainties in areas such as the effect of waste presence on repository stability; the probabilities and consequences of intrusive acts by humans; the validity of data used in modeling studies; the design and regulatory actions needed to minimize possibilities of repository failure, projection of future societal habits and demographics, and finally, the relative importance of various potential initiating events.

NUREG-0116 at 4-94.

In the face of these uncertainties, the Commission made no real attempt to demonstrate that the risks were insubstantial. It simply assumed them away. On the critical question whether the proposed model repository will work, for example, the Commission stated that it found a "reasonable basis" to conclude "that the repository can maintain its integrity, *provided that* sites meeting the selection criteria can in fact be found and developed." 44 Fed. Reg. 45,362, 45,368 (1979) (emphasis added). The NRC found the evidence for site availability "tentative but favorable," based upon the testimony of one USGS witness who conceded that it was possible sites could be found but was generally critical of the NRC's approach. *Id.* On the question whether sites would be found and a repository actually built, the Commission simply assumed that "the strong incentive to develop sound waste disposal methods and the major effort now directed to this goal make it likely that a means of effective isolation will be found." *Id.* at 45,369 n.27.

The government now argues that the Commission found, as a fact, that the acknowledged risks were so low as to be negligible. It points to the Commission staff's

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and only such assessments can truly apply to a specific site. . . . Uncertainties associated with risk assessment derive from lack of data, lack of experience, inability to identify all release mechanisms for radionuclides, the natural variability in physical properties of geologic media, and inability to predict long-term geologic and climatic processes and social evolution." *Id.* at 46, J.A. at 391-92.

estimate that "consequences of all but the most improbable events will be small." NRC Brief at 37. It also notes that the Commission's hearing board saw "no reason to doubt that the model repository could be constructed and operated to bury the wastes as proposed." *Id.* Petitioner Com Ed further provides calculations, based on the rulemaking record, of what it regards as the quantifiable risks of waste disposal, arguing that they are barely mathematically existent. Com Ed Brief at 29-31.

These arguments overlook, however, the most important categories of risk associated with high-level radioactive waste. First, as noted earlier, there are the substantial risks involved in keeping such wastes above ground while the nation decides when, how and where to build repositories. The longer this problem goes unresolved, the greater the chances of a serious accident involving release of radiation. Second, petitioners utterly disregard the nature of uncertainty. The Commission has acknowledged that it simply does not know all the answers. It is predicting a rosy outcome based on exceedingly imperfect knowledge, but refuses to disclose the extent of its guesswork to the decisionmaker, the public and Congress. Yet, a substantial risk exists that problems not fully anticipated by the Commission or current planners may well cause serious delay in the waste disposal program, or even the failure of a future repository.[64]

It is insufficient to assert, as Com Ed does, that the probability of a "natural geological event" causing a breach of the repository is fairly represented by the chance of a geologic fault intersecting the repository, a chance which Com Ed calculates at one in 25 billion years. Com Ed Brief at 30. According to the USGS, "[g]eology is basically a retrodictive rather than a pre-

[64] *See, e.g.*, IRG Report at 88 (detailing the "significant institutional difficulties" involved in planning and developing a repository and concluding "that a more detailed analysis of logistical and other institutional problems which would arise out of attempting to manage wastes on the scale require[d] should be undertaken.").

dictive science." J.A. at 323. No certainty can be attached to predictions about the future occurrence of major geological events; at most, they are only "estimates." J.A. at 322-23. Indeed, the Commission in its draft explanatory narrative of Table S-3 has admitted as much, observing that "there is no way to predict with *any* degree of certainty . . . the environmental behavior of long-lived radionuclides, and the occurrence of catastrophic climatic and geologic changes." 46 Fed. Reg. 15,154, 15,166 (1981) (emphasis added).

Uncertainties regarding other possible events, such as human intrusion or geologic events initiated by the presence of hot radioactive wastes, are even higher. On the question of human intrusion, for example, the EPA's Ad Hoc Panel of Earth Scientists reported:

> Intrusion of a repository at some future date in the search for mineral materials, including the uranium and TRU elements that were buried, or to satisfy archeological or other curiosities, appears to us also to be a risk for which no trustworthy probability estimates may be applied for the time span over which the integrity of the repository is to be assured.

J.A. at 362. Moreover, the USGS expressed strong reservations about the NRC staff's handling of the uncertainties regarding the impact of waste on the repository itself. "[G]eologic events or processes caused by the repository or the waste, are given only brief discussion not indicative of the many potential processes and interactions that may take place," the USGS stated. "The text indicates many gaps in knowledge suggesting that in general the present uncertainties of predictive modeling of waste behavior are very high." J.A. at 141.

It is this record of documented uncertainty regarding both the probabilities and the consequences of releases of radiation from high-level waste which renders the Commission's asserted finding of negligible risk unsupportable. As the court of appeals held, "read as a finding of no

significant risk . . . the zero-release assumption represents a self-evident error in judgment." *NRDC v. NRC II*, 685 F.2d at 481. *Cf. Citizens to Preserve Overton Park, Inc. v. Volpe*, 401 U.S. 402, 416 (1971) (discussing "arbitrary and capricious" standard of review).

In a final attempt to save the zero-release assumption as a factual finding, petitioners point to the Commission's statement in promulgating the final rule that "taking post-sealing releases as zero does not significantly reduce the overall conservatism of the table." 44 Fed. Reg. 45,362, 45,369 (1979). Petitioners assert that the Commission properly found that any over-optimism reflected in the zero-release assumption is compensated for by the "conservative" assumption in Table S-3 that all of the volatile gases in the fuel will be released before the repository is sealed. Com Ed Brief at 24-34; NRC Brief at 38-39.

This supposed conservatism is based on the assumption that all of the tritium, krypton-85, and carbon-14 in the fuel from the model reactor will be released either during reprocessing or prior to sealing of the fuel in a repository.[65] The "conservatism" built into Table S-3, however, is *at most* the assumption that releases of tritium and krypton-85 will be just over half again as large as the figure the Commission's hearing board on the Table S-3 rule would have found to be realistic. According to the hearing board, the estimated 18,000 curie release of tritium from reprocessing "is an overestimate by a factor of 1.2 to 1.6." Report of the Hearing Board at 19, Pet. App. at 290a. The krypton release of 400,000 curies "is also an overestimate by a factor of 1.2 to 1.7." *Id.* The hearing board concluded that "whether the carbon-14 release is an overestimate is uncertain." *Id.*

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[65] Other trace amounts of volatile materials are assumed to be released, but none in significant quantities.

The Commission never made any attempt to compare, on a scientific basis, the health effects likely to be produced by these small additional releases of krypton and tritium with the health effects that could result from releases of the radioactivity contained in the high-level nuclear waste. To be meaningful, such a comparison would, as petitioner Com Ed notes, need to "take account of the quality, half-life, or pathways to man of the isotopes involved." Com Ed Brief at 28 n.34. Most important, it would have to take account of the different toxicities of different radionuclides.[66] The Commission's assumption that Table S-3 is "conservative overall" is thus lacking in any reasoned basis or meaningful support in the record.

In short, the record of this rulemaking does not support a finding that the risks of high-level nuclear waste disposal are negligible or not worthy of consideration in the licensing process. The Commission's "zero-release assumption" is patently arbitrary and capricious. Given the major risks and uncertainties which exist, the Commission's asserted belief that future developments will ensure a perfect solution is insufficient to justify eliminating this problem as a consideration altogether. As a result, the court below properly found the Table S-3 rule to be invalid, and its judgment remanding the rule to the Commission should be upheld.

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[66] To take a simple example, the Radiation Concentration Guides promulgated by the NRC demonstrate the different toxicities of various radionuclides by showing the quantities of air or water required to dilute radioactive substances to maximum allowable levels for unrestricted use. *See* 10 C.F.R. pt. 20. Based on Appendix B of the regulations, it can be calculated that the quantity of air required to dilute one curie of krypton-85 is 3.3 billion liters. The comparable figures for insoluble strontium-90, one of the principal constituents of solid high-level waste, is 5 *trillion* liters. *See also* Gofman, *Radiation and Human Health* 40-41 (1981) (releases of longer-lived radionuclides cause more damage than similar curie releases of radionuclides with shorter half-lives).

III. THE ORIGINAL AND INTERIM RULES ARE INVALID BECAUSE THEY PRECLUDED CONSIDERATION OF THE HEALTH, SOCIOECONOMIC AND CUMULATIVE EFFECTS OF FUEL CYCLE ACTIVITIES

The court of appeals also invalidated the original and unamended interim versions of the Table S-3 rule on the grounds that they prevented licensing boards from considering the health, socioeconomic and cumulative effects of uranium fuel cycle activities. Radiological releases are set forth in Table S-3 simply in numbers of curies per "reference reactor year." No attempt is made to discuss or disclose the health effects of these curie releases, such as the number of potential cancer deaths or genetic defects they may cause. Nor is there any discussion of the socioeconomic and cumulative effects of building multiple repositories to handle the spent fuel and high-level wastes from dozens of nuclear plants. Since the rule stated that "the contribution of the environmental effects of . . . management of . . . high level wastes . . . shall be as set forth in Table S-3," the court concluded that disclosure or consideration of the health, socioeconomic and cumulative effects of waste disposal activities was precluded.

Petitioners make three arguments in response. First, petitioner BG&E contends that the earlier versions of Table S-3 were valid even if they had such a preclusive effect, because it was within the Commission's discretion to describe the environmental effects of the fuel cycle solely in terms of curies of radiation to be released, without any other explanation. Plainly, however, it is the intent of NEPA that environmental impacts be disclosed in a form which will meaningfully convey the environmental effects of the proposed action.[67] The Commission itself

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[67] The 1973 CEQ guidelines, in effect at the time of this rulemaking, state:

> In developing the [EIS] agencies should make every effort to convey the required information succinctly in a form easily understood, both by members of the public and by public decision-makers . . . .

recognized that merely discussing "curies" did not suffice; it amended the Table S-3 rule to make clear that health and other effects could be discussed in individual licensing proceedings. 10 C.F.R. § 51.20(e) (1979).[68]

Petitioners' second argument is that the court of appeals' ruling on health and other effects was "metachronistic," Com Ed Brief at 47 n.51, in that it applied more recent versions of NEPA's requirements to invalidate the original and interim rules. Yet, as the court below noted, it has long been settled that NEPA requires disclosure of the health, socioeconomic and cumulative effects of proposed federal actions.[69] Moreover, the 1973 CEQ guidelines call for discussion of the "cumulative environmental impacts" of the "proposed action and other related Federal projects." 40 C.F.R. § 1500.8(a) (1978).

Petitioners' third and most important argument is that the original and interim rules did not, as the court below found, preclude discussion and disclosure of these effects in individual licensing proceedings. Both the original and interim version of the rule provided, however, that "the contribution of the environmental effects of . . . fuel cycle activities . . . shall be *as set forth* in Table S-3 . . . . No further discussion of such environmental effects shall be required." 39 Fed. Reg. 14,188, 14,191; 10 C.F.R. § 51.20(e) (1978) (emphasis added). The Commission

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40 C.F.R. § 1500.8(b) (1978); *see also Silva v. Lynn*, 482 F.2d 1282, 1285 (1st Cir. 1973).

[68] Similarly, the Department of Energy recently noted that the "expression of quantity of radioactivity in curies without qualification is . . . irrelevant." U.S. Department of Energy, Final Environmental Impact Statement, Management of Commercially Generated Radioactive Waste (DOE/EIS-0046F), Vol. 3, p. 135 (1980).

[69] *See, e.g., Kleppe v. Sierra Club*, 427 U.S. 390, 413 (1976); *NRDC v. Callaway*, 524 F.2d 79, 88 (2d Cir. 1975); *Trinity Episcopal School Corp. v. Romney*, 523 F.2d 88, 93 (2d Cir. 1975); *Hanly v. Mitchell*, 460 F.2d 640, 647 (2d Cir.), *cert. denied*, 409 U.S. 990 (1972); *Ely v. Velde*, 451 F.2d 1130, 1137-38 and n.22 (4th Cir. 1971); *Prince George's County, Maryland v. Holloway*, 404 F. Supp. 1181, 1186 (D.D.C. 1975); *see also* S. Rep. No. 296, 91st Cong., 1st Sess. 5 (1969).

has conceded that these rules were interpreted "at least initially . . . as cutting off further discussion of fuel cycle impacts." 44 Fed. Reg. 45,362, 45,364 (1979).[70] As the Commission has acknowledged:

> [T]he rule in practice was [applied] as allowing fuel cycle impacts to be addressed in reactor licensing proceedings solely by the formal act of displaying Table S-3 in impact statements, with no further discussion. In particular, impact statements prepared by the staff did not analyze fuel cycle impacts in terms of health effects which might be caused by the radioactive releases tabulated in the rule and did not discuss socioeconomic or cumulative impacts.

Id. On this issue, the Commission stands condemned by its own words.

Respondent repeatedly made the point in this proceeding that Table S-3 failed to disclose the health, socioeconomic and cumulative effects of the fuel cycle. *See, e.g.*, NUREG-0216 at B-96, B-102. This is not a case of "holding . . . rules invalid on behalf of hypothetical intervenors. . . ." NRC Brief at 48. The NRC's rule should not be immunized simply because the agency has now, belatedly, changed its mind about the extent to which Table S-3 forecloses any other disclosure or discussion of the effects of the uranium fuel cycle.

* * * *

Nuclear power, which was promoted with great confidence in the 1950's and 1960's, has been licensed for wide use in the United States on the premise that the environmental costs of dealing with its wastes were negligible or manageable. Confidence in this assumption

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[70] *See also* 43 Fed. Reg. 15,613, 15,615 (1978) (original and interim Table S-3 rules "did not include [health] effects in the actual table" and thus "health effects were not discussed in individual licensing proceedings" until 1977); Note, *The Use of Generic Rulemaking to Resolve Environmental Issues in Nuclear Power Plant Licensing*, 61 U. Va. L. Rev. 869, 884 (1975) (original Table S-3 rule "foreclos[ed] staff review of these [environmental] effects in individual applications as well as discussion of these issues in licensing hearings.").

nas been eroded by a series of failures in the waste management program, including abandonment of the first proposed nuclear waste disposal site at Lyons, Kansas, for environmental reasons and continued controversy over the military waste project in Carlsbad, New Mexico.

Public confidence in future licensing actions with respect to nuclear power cannot be furthered by lack of candor or clarity in the environmental impact statements prepared by the Nuclear Regulatory Commission or other governmental agencies dealing with nuclear power questions. The Court of Appeals for the District of Columbia Circuit reviewed the Commission's generic rule on nuclear waste disposal as this Court directed it to do on remand. Its judgment, in full compliance with the direction of this Court and with the Congressional mandate in NEPA, should stand.

On remand, the Commission need not reopen the evidentiary record. Rather, the Commission could correct the existing defect by merely supplementing the Table S-3 rule with a brief narrative that identifies the significant risks associated with nuclear waste, summarizes the uncertainties surrounding waste disposal solutions, and allows the licensing boards to consider these risks when reaching decisions in close cases.

CONCLUSION

The judgment of the court of appeals should be affirmed.

Respectfully submitted,

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TABLE S-3—TABLE OF URANIUM FUEL CYCLE ENVIRONMENTAL DATA [1]

(Normalized to model LWR annual fuel requirement (WASH-1248) or reference reactor year (NUREG-0116))

Environmental considerations	Total	Maximum effect per annual fuel requirement or reference reactor year of model 1,000 MWe LWR
NATURAL RESOURCES USE		
Land (acres):		
Temporarily committed:	100	
Undisturbed area	79	
Disturbed area	22	Equivalent to a 110 MWe coal-fired power plant
Permanently committed	13	
Overburden moved (millions of MT)	2.8	Equivalent to 95 MWe coal-fired power plant
Water (millions of gallons):		
Discharged to air	160	2 percent of model 1,000 MWe LWR with cooling tower
Discharged to water bodies	11,090	
Discharged to ground	127	
Total	11,377	4 percent of model 1,000 MWe LWR with once-through cooling
Fossil fuel:		
Electrical energy (thousands of MW-hour)	323	5 percent of model 1,000 MWe LWR output
Equivalent coal (thousands of MT)	118	Equivalent to the consumption of a 45 MWe coal-fired power plant
Natural gas (millions of SCF)	135	0.4 percent of model 1,000 MWe energy output
EFFLUENTS—CHEMICAL (MT)		
Gases (including entrainment):		
SO_x	4,400	
NO_x [2]	1,190	Equivalent to emissions from 45 MWe coal-fired plant for a year
Hydrocarbons	14	
CO	29.5	
Particulates	1,154	
Other gases:		
F	67	Principally from UF$_6$ production, enrichment, and reprocessing. Concentration within range of state standards—below level that has effects on human health
HCl	014	
Liquids:		
SO_4^{--}	9.9	From enrichment, fuel fabrication, and scrapping steps. Components that constitute a potential for adverse environmental effect are present in dilute concentrations and receive additional dilution by receiving bodies of water to levels below permissible standards. The constituents that require dilution and the flow of dilution water are:
NO_3^-	25.8	NH$_3$—600 cfs
Fluoride	12.0	NO$_3$—37 cfs
Ca	5.4	Fluoride—72 cfs
Cl	8.5	
Hg	12.1	
NH$_3$	10.0	
Fe	4	
Tailings solutions (thousands of MT)	240	From mills only—no significant effluents to environment
Solids	91,000	Principally from mills—no significant effluents to environment
EFFLUENTS—RADIOLOGICAL (CURIES)		
Gases (including entrainment):		
Rn-222		Presently under consideration by the Commission
Ra-226	02	
Th-230	02	
Uranium	034	
Tritium (thousands)	18.1	
C-14	24	
Kr-85 (thousands)	400	
Ru_{-106}	14	Principally from fuel reprocessing plants
I-129	1.3	
I-131	83	
Tc-99		Presently under consideration by the Commission
Fission products and transuranics	203	
Liquids:		
Uranium and daughters	2.1	Principally from mining—included tailings solution and returned to ground—no effluents; therefore, no effect on environment
Ra-226	0034	From UF$_6$ production
Th-230	0015	
Th-234	01	From fuel fabrication plants—concentration 15 percent of 10 CFR 20 for total processing 26 annual fuel requirements for model LWR
Fission and activation products	5.9 · 10^{-6}	
Solids (buried on site):		
Other than high-level (shallow)	11,300	9,100 Ci comes from low-level reactor wastes and 1,500 Ci comes from reactor decommissioning and decontamination—buried at land burial facilities. 600 Ci comes from mills—included in tailings returned to ground. Approximately 60 Ci comes from conversion and spent fuel storage. No significant effluent to the environment.
TRU and HLW (deep)	1.1 · 10^{-4}	Buried at Federal Repository
Effluents—thermal (billions of British thermal units)	4,083	< 5 percent of model 1,000 MWe LWR
Transportation (person-rem):		
Exposure of workers and general public	2.5	
Occupational exposure (person-rem)	22.6	From reprocessing and waste management

[1] In some cases where no entry appears it is clear from the background documents that the matter was addressed and that in effect the Table should be read as if a specific zero entry had been made. However, there are other areas that are not addressed at all in the Table. Table S-3 does not include health effects from the effluents described in the Table or estimates of releases of Radon-222 from the uranium fuel cycle or estimates of Technetium-99 released from waste management or reprocessing activities. These issues may be the subject of litigation in the individual licensing proceedings.

Data supporting this table are given in the "Environmental Survey of the Uranium Fuel Cycle," WASH-1248, April 1974; the "Environmental Survey of the Reprocessing and Waste Management Portion of the LWR Fuel Cycle," NUREG-0116 (Supp. 1 to WASH-1248); the "Public Comments and Task Force Responses Regarding the Environmental Survey of the Reprocessing and Waste Management Portions of the LWR Fuel Cycle," NUREG-0216 (Supp. 2 to WASH-1248); and in the record of the final rulemaking pertaining to Uranium Fuel Cycle Impacts from Spent Fuel Reprocessing and Radioactive Waste Management, Docket RM-50-3. The considerations from reprocessing, waste management and transportation of wastes are maximized for either of the two fuel cycles (uranium only and no recycle). The contribution from transportation excludes transportation of cold fuel to a reactor and of irradiated fuel and radioactive wastes from a reactor which are considered in Table S-4 of § 51.20(g). The contributions from the other steps of the fuel cycle are given in columns A-E of Table S-3A of WASH-1248.

[2] The contributions of temporarily committed land from reprocessing are not prorated over 30 years, since the complete temporary impact accrues regardless of whether the plant services one reactor for one year or 57 reactors for 30 years.

[3] Estimated effluents based upon combustion of equivalent coal for power generation.

[4] 1.2 percent from natural gas use and process.